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Research  
Service

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## Soil Management, Landscape Attributes, and Soil Variability Impacts on Cotton Productivity

### Why Does it matter?

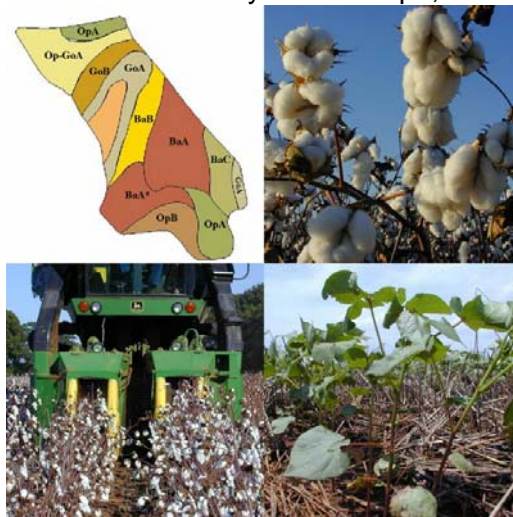
Soil management practices like conservation tillage must be evaluated at the field scale because producers are reluctant to adopt management recommendations derived from small plots. Additionally, understanding how soil management practices impact cotton productivity across landscapes would enable producers to better match economic inputs to production capabilities of their fields.

### What was done?

We determined the impact of soil management systems on yield, soil water, and indicators of drought stress for cotton grown in rotation with corn on a 20 acre field for three years. In the conventional systems, tillage consisted of chisel plowing/disking + in-row subsoiling; no cover crop was used in winter. Conservation systems consisted of only non-inversion in-row subsoiling plus winter cover crops to provide 4 to 6 tons/acre of residue for complete soil coverage. Management practices were arranged so as to cross the maximum landscape variability in the field.

### What was found?

Conservation systems had greater rainfall infiltration, improved water use efficiency and less drought stress, resulting in 14% higher yields over the 3 growing seasons (average 2430 lb seed cotton/acre) compared to conventional systems. Slope, bulk soil electrical conductivity, soil carbon or organic matter, and clay content explained 16 to 64% of the variability in cotton yields, but their relative importance varied among management practices and growing seasons. When the field was delineated into management zones using soil and landscape properties identified as affecting yield, the conservation system was more productive than the conventional system in 87% of the zones. Yearly variations in yields were also reduced with conservation systems. The study showed conclusively, even at the scale of operations used by producers, that conservation systems using no-tillage and high-residue producing cover crops minimized drought stress, reduced economic risks from yield variations, and increased cotton yields.



### What is the impact?

This information can be used by extension specialists, USDA-NRCS, crop consultants, and producers to promote the use of environmentally and economically sustainable conservation practices on the 4.2 million acres of cotton grown in the Southeast.

### Research Team and Contact information

#### Cooperating Scientists:

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